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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
YANG, NELSON C	

ART UNIT	PAPER NUMBER
1641	

DATE MAILED: 04/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/040,303	POURMAND ET AL.	
	Examiner	Art Unit	
	Nelson Yang	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 113-133* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 113-133* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/24/05 2/7/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

HL

DETAILED ACTION

Response to Amendment

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 25, 2005 has been entered.

2. Applicant's amendment of claims 1, 11, 12, 113, and 125 is acknowledged and has been entered.

3. Applicant's cancellation of claims 10 and 17 is acknowledged and has been entered.

4. Claims 1-9, 11-16, 113-133 are currently pending.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 130-133 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. With respect to claims 130-133, it is unclear how the transient electrical signal giving rise to a decaying waveform is generated and controlled, such that the waveform decays in 1 minute to 1 millisecond, or 5 seconds to 10 milliseconds. In particular, it is unclear if applicant is limiting the analytes to be detected to those that would produce transient electrical signal giving rise to a decaying waveform that decays in 1 minute to 1 millisecond, or 5 seconds to 10

milliseconds, or this limitation is the result of some undisclosed structural element or method step, or if the limitation is a property inherent to the method itself, such that all processes with the same limitations would produce transient electrical signal giving rise to a decaying waveform that decays in 1 minute to 1 millisecond, or 5 seconds to 10 milliseconds.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-3, 5, 7, 11-13, 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Park et al [Park et al, In vivo nitric oxide sensor using non-conducting polymer-modified carbon fiber, 1998, Biosensors & Bioelectronics, 13, 1187-1195].

With respect to claim 1, Park et al teach a method of detecting nitric oxide with a carbon fiber sensor with a composite polymer, comprising Nafion, m-phenylenediamine, and resorcinol (abstract, p.1187, col.2). The presence of nitric oxide gives rise to a signal with a decaying waveform (figs. 2, 5) caused by oxidation of NO at the sensor surface (p.1191, col.2). The oxidatized NO forms NO^+ is then stabilized by the negatively charged Nafion layer and prevents a complicated pattern of reactions that could lead to the formation of nitrite and nitrate that would affect the signal (p.1191, col.2).

10. With respect to claims 2-3, the characterizing feature can be the movement and quantity of NO toward the sensor, or the charge of the oxidized NO, or the stabilization of the charged NO by the Nafion layer (p.1189, col.2, 1191, col.2).

11. With respect to claim 5, the method taught by Park et al was performed in stirred PBS solution under unaerated conditions using a nitrogen gas (fig. 2).

12. With respect to claim 7, the Nafion coating and polymer layer are polymers (abstract).

13. With respect to claims 11, 12, the composite polymer is immobilized on carbon fiber electrodes (p.1189, col.1), the working electrode. In a two-electrode configuration, a silver chlorinated wire was used as the reference electrode (p.1189, col.1).

14. With respect to claims 13, 15, the signal was plotted as current over time (figs. 2, 5).

15. Claims 1-5, 7, 9, 11-14, 113, 117, 119-121, 123-125, 127, 129, are rejected under 35 U.S.C. 102(e) as being anticipated by Wang et al [US 6,468,785].

With respect to claim 1, Wang et al teach methods for electrochemical detection of DNA hybridization utilizing oligonucleotide-containing polymer-coated electrodes (column 3, lines 1-35). Hybridization activity produces distinct transient hybridization current peaks of opposite directions in the presence of complementary and noncomplementary DNA sequences (column 8, lines 9-30).

16. With respect to claim 2, Wang et al teach that hybridization activity produces distinct transient hybridization current peaks of opposite directions in the presence of complementary and noncomplementary DNA sequences (column 8, lines 9-30).

17. With respect to claim 3, Wang teach that a decreased current is observed upon adding a complementary target, which may reflect increased charge density (column 12, lines 1-5).

18. With respect to claim 4, Wang teach that a cathodic response to non-complementary oligomer strands is observed, which may be attributed to conductivity or capacitance changes associated with their electrostatic repulsion (column 12, lines 5-10).

19. With respect to claim 5, the sample is comprised of solutions of oligomers (column 6, lines 40-50).

20. With respect to claims 7, 9, the polymer comprises oligonucleotides (abstract).

21. With respect to claims 11-12, the polymer can be coated onto any art conventional electrode (column 7, lines 25-30), and a counter and reference electrode are also employed.

22. With respect to claim 13, Wang et al teach that the change in the electrical signal may reflect changes in current, charged density, conductivity, or capacitance (column 12, lines 1-10).

23. With respect to claim 14, Wang et al teach that the analyte is detected by means of potential difference (voltage) (column 11, lines 15-23).

24. With respect to claims 113, 125, Wang et al teach a suitable voltammetric detection system with a working electrode coated with an oligonucleotide-containing polymer, a counter and reference electrode (column 3, line 1-35, column 10, lines 26-36), measuring the potential difference, and injecting test samples once the potential difference stabilizes and measuring the increase in the potential difference (column 11, lines 15-25), due to hybridization activity (column 11, lines 35-51). In general the working potential rapidly increases upon detection, with a fast return to baseline (column 11, lines 15-23).

25. With respect to claims 117, 119-121, 123, 127, 129, the measuring the potential difference due to the analyte, is concentration dependent (column 11, lines 24-35).

26. With respect to claim 124, Wang et al teach that the invention provides for genetic analysis, diagnostic applications, and hybridization analysis and the like (column 6, lines 1-5).

27. With respect to claims 130-133, Wang et al teach hybridization peaks with a peak width of approximately 7 seconds, where the response times to reach 90% of the maximum signal were approximately 3 seconds (column 16, lines 55-62). The decay rate would therefore be approximately 4 seconds.

28. Claims 1-3, 5, 7-9, 11-13, 15 rejected under 35 U.S.C. 102(b) as being anticipated by Yacynych [US 5,540,828].

With respect to claim 1, Yacynych teaches a system comprising biosensors with a composite layer comprising analyte-sensing agent and a polymer film (column 5, lines 20-45). Analytes are detected amperometrically at the base electrode using well-known techniques upon reaction of the analytes with the analyte sensing agent (column 6, lines 19-30).

29. With respect to claims 2, 3 Yacynych teach that the analytes are detected amperometrically at the base electrode upon reaction of the analytes with the analyte sensing event (column 6, lines 19-30).

30. With respect to claim 5, the analyte is in a chemical or biological liquid (abstract).

31. With respect to claims 7-9, the analyte sensing agent can be enzymes, antibodies, antigens, and biomolecular receptors (column 5, lines 40-45)

32. With respect to claims 11-12, the biosensor comprises a base electrode and a reference electrode (column 5, lines 50-65).

33. With respect to claims 13, 15, analytes are detected amperometrically (column 6, lines 19-30).

34. Claims 1-3, 6-8, 11-13, 15, 113-118, 125-128 are rejected under 35 U.S.C. 102(b) as being anticipated by Saini et al [US 5,521,101].

35. With respect to claims 1, 113, 125, Saini et al teach a method of determining an analyte in the gaseous or vapour phase and in which a bioreceptor is retained at an electrode (abstract), comprising roviding a electrochemical cell comprising a microvoltammetric sensing electrode, an bioreceptor such as an enzyme or synzyme immobilized on a support in electrical contact with the microvoltammetric sensing electrode, exposing the cell to a gaseous or vapor phase suspected of containing the analyte, whereby the analyte contacts the enzyme or synzyme, generating a detectable electrical response relatable to the presence of the analyte, determining the electrical response by the microvoltammetric sensing electrode to determine the presence or amount of the analyte (claim 1). Saini et al also teach that the bio-receptor can be any biological molecule that binds to a reactant and produces a detectable electrochemical reaction, including antibodies and binding proteins (column 3, lines 40-45).

36. With respect to claims 2-3, the characterizing feature is the movement of the analyte toward the sensor and reaction with the enzyme or synzyme (claim 1, column 8, lines 20-40).

37. With respect to claim 6, the conducting medium would be a gaseous or vapour phase (column 7, lines 40-55).

38. With respect to claims 7-8, 114-118, 126-128 the immobilized molecule can be an enzyme, an antibody, or a binding protein (column 3, lines 40-45).

39. With respect to claims 10-12, the method provides a cell comprising a sensing electrode and a counter electrode which also acts as a reference electrode (column 8, lines 34-40).

40. With respect to claim 15, current was also measured over a period of time (fig. 3).

41. Claims 1-3, 5-9, 13-16, 113-117, 118-121, 125-129 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukushima et al [US 6,762,050].

With respect to claims 1-3, 113, 125, Fukushima et al teach a method comprising a sensor device, wherein different conducting polymers are deposited onto different regions of the array to produce a device specific to a group or class of chemicals (column 6, lines 45-55), such that electromobile protein molecules when bound or absorbed to the device produce minute current changes resulting from electron transfer from the protein (column 7, lines 15-20). The samples can be liquid samples or gases (column 6, lines 20-25).

42. With respect to claims 5-6, the conducting medium can be liquid samples or gases (column 6, lines 20-25).

43. With respect to claims 7-8, 114, different conducting polymers are deposited onto different regions of the array to produce a device specific to a group or class of chemicals (column 6, lines 45-55), such as biotin molecule film (column 7, lines 34-38), which is a polypeptide.

44. With respect to claims 9, 118-121, 123-124, 127-129, the sensor device can be used to sense proteins, DNA antibodies, receptors, and lectins.

45. With respect to claims 11-12, Fukushima et al teach that the sensor device comprises a pair of electrodes (claim 1). One of the electrodes could then be considered a working electrode and the other a reference electrode.

46. With respect to claims 13-15, Fukushima et al teach measuring minute current changes (column 7, lines 15-20) and voltage changes (column 5, lines 40-50).

47. With respect to claim 16, the current change results from electron transfer from the protein (column 7, lines 15-20), which would be an accumulated charge.

48. With respect to claim 115-117, 126, Fukushima et al teach a biotin molecule film to which an avidin-ferritin binding protein is adsorbed (column 7, lines 30-45).

Claim Rejections - 35 USC § 103

49. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

50. Claim 122 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al [US 6,468,785] in view of Henkens et al [US 6,391,558].

Wang et al teach a method of detecting a nucleic acid analyte in a sample, as discussed above. Wang et al do not teach that the nucleic acid analyte comprises a SNP.

Henkens et al, however, do teach the detection of SNPs and further teach that SNPs are important for mapping and discovering genes associated with common diseases (column 23, lines 20-25), and that SNPs can be used as genetic markers in mapping studies (column 23, lines 5-10). In particular Henkens et al teach that SNPs have many properties that make them a good choice as the primary analytical target for the study of human sequence variation which are particularly important for mapping and discovering genetic factors that are major health threats (column 22, lines 58-65).

Therefore it would have been obvious to detect SNPs using the method of Wang et al as taught by Henkens et al, because Henkens et al teach that SNPs are composed of DNA and the

method of Wang et al is for the detection of DNA. Therefore, by detecting SNPs in the method of Wang et al, it would be possible for mapping and discovering genetic factors that are major health threats.

51. Claim 122 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukushima et al [US 6,762,050] in view of Henkens et al [US 6,391,558].

Fukushima et al teach a method of detecting a nucleic acid analyte in a sample, as discussed above. Fukushima et al do not teach that the nucleic acid analyte comprises a SNP.

Henkens et al, however, do teach the detection of SNPs and further teach that SNPs are important for mapping and discovering genes associated with common diseases (column 23, lines 20-25), and that SNPs can be used as genetic markers in mapping studies (column 23, lines 5-10). In particular Henkens et al teach that SNPs have many properties that make them a good choice as the primary analytical target for the study of human sequence variation which are particularly important for mapping and discovering genetic factors that are major health threats (column 22, lines 58-65).

Therefore it would have been obvious to detect SNPs using the method of Fukushima et al, as taught by Henkens et al, because Henkens et al teach that SNPs are composed of DNA and the method of Wang et al is for the detection of DNA. Therefore, by detecting SNPs in the method of Fukushima et al, it would be possible for mapping and discovering genetic factors that are major health threats.

Response to Arguments

52. Applicant's arguments filed January 25, 2005 have been fully considered but they are not persuasive.

53. Applicant argues that the amended claims overcome the prior art because the claims recite providing a system comprising one or more passive detection elements, whereas the cited prior art are active detection elements in that they require an externally applied electrical stimulus. In Park et al [Park et al, In vivo nitric oxide sensor using non-conducting polymer-modified carbon fiber, 1998, Biosensors & Bioelectronics, 13, 1187-1195], a constant potential is applied (p.1192, col.1); in Wang et al [US 6,468,785], amperometric detection (constant potential) is used (claim 23), as well as with Yancynych et al [US 5,540,828] (claim 1) and Saini et al [US 5,521,101] (column 11, lines 65-67).

In the specification, applicant defines passive detection elements as elements that merely passively observe or monitor the medium for the transitory electrical signal, and do not impart any stimulus to the medium and/or detection element components (p. 11, lines 19-29). Applicant, however, fails to define what a stimulus is, although applicant does provide examples of stimuli as being injected current, voltage disturbance, electrochemical disturbance, etc. However, in the prior art, the electrodes are maintained at a constant potential, and therefore, there is no injected current, voltage disturbance, or electrochemical disturbance that occurs, and therefore would not constitute a stimulus based on applicant's examples. While it is noted that applicants' examples do not necessarily limit the definition of a stimulus, no definition of stimulus has been provided that would suggest that maintaining the electrodes at a constant potential would be considered a stimulus.

54. With respect to the examples, while the examples do provide more detailed steps as to how the method is performed that are novel over the cited art, these steps are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations

from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

55. No claims are allowed.

56. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson Yang whose telephone number is (571) 272-0826. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long V. Le can be reached on (571)272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

57. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nelson Yang
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04/18/05